

IN THE CLAIMS

18. (Currently Amended) A combined earth-star sensor system for three-axis attitude determination and orbit tracking of a satellite in space, said combined earth-star sensor system (1) comprising separate apertures (7, 6) with different directions of observation of earth (14) and its rim (13) and stars to receive light from the earth (14) and stars (16, 17), having respective levels of brightness and common image pickup devices (4) for the earth observation and the star observation, and an evaluation system for determining attitude and orbit of the satellite based on earth observation of the rim (13) of the earth (14) and star observations and wherein star observation is compared to a star catalog (20) and for star images (18) which are superimposed on ~~the~~ an image of the rim of the earth (15), said image of the rim of the earth on which the star images are superimposed ~~star images~~ are disregarded to eliminate interference of the star images on accuracy of determining the rim (14) of the earth .

19. (Previously Presented) The sensor system according to claim 18, comprising a common optical arrangement (2) for earth observation and star observation, and a deflection mirror (3) for reflection of laterally entering light from the earth, to the common optical arrangement (2).

20. (Previously Presented) The sensor system according to claim 18, comprising an optical arrangement (9) for star observation, an optical arrangement (10) for earth observation and a semitransparent beam splitter (8)

between said apertures and the optical arrangements for deviating laterally entering light from the earth and transmitting light from the observed star, to the image pickup devices (4).

21. (Previously Presented) The sensor system according to claim 20, wherein light from the star travels longitudinally to the optical arrangement for star observation.

22. (Previously Presented) The sensor system according to claim 18, wherein the aperture for the light from the earth is considerably smaller than the aperture for the light from the star.

23. (Previously Presented) The sensor system according to claim 19, wherein the aperture for the light from the earth is considerably smaller than the aperture for the light from the star.

24. (Previously Presented) The sensor system according to claim 20, wherein the aperture for the light from the earth is considerably smaller than the aperture for the light from the star.

Claims 25-30 - Cancelled

31. (Currently Amended) A method for simultaneous orbit

determination and attitude determination of a space vehicle, comprising:

simultaneously forming images of stars and the rim of the earth in a common focal plane of a sensor system;

determining attitude of ~~the~~ a star in said focal plane;

determining the rim of the earth by image processing;

determining rates of rotation of the sensor system from movement of ~~the~~ said star image in the focal plane; and

calculating at least one of orbit and altitude of the space vehicle carrying the sensor system, wherein an evaluation system of the sensor system carries out star tracking and tracking of the rim of the earth, and wherein said star images in said common focal plane are identified from a star catalog and only star images ~~out of the influence of~~ outside the rim of the earth are utilized in star tracking whereas areas in the images in the common focal plane in which the star images ~~which are superimposed on the image of the rim of the earth are~~ disregarded to eliminate disruptive interference of such superimposed star images on accuracy of determining the rim of the earth.

Claim 32 - Cancelled

33. (Currently Amended) The method according to claim ~~32~~ 31, comprising effecting model-based tracking of the rim of the earth.

34. (Previously Presented) The method according to claim 31, comprising

filtering a long-wave fraction of the radiation used for determining the rim of the earth.

35. (Previously Presented) The method according to claim 31, wherein the rim of the earth is determined by fitting earth models.

36. (Previously Presented) The sensor system according to claim 18, wherein said means for variable control of exposure time operates to produce successive image frames of respective long and short duration, the light from the stars being produced on long duration image frames and the light from the earth being produced on the short duration frames.

Claim 37 - Cancelled

38. (Previously Presented) The sensor system according to claim 18, including means for variable control of exposure time of earth and star observations by said common image pickup devices depending on the brightness of the earth and the stars being observed.

Claim 39 - Cancelled

40. (Previously Presented) The method according to claim 31, in which exposure or integration time of the sensor system is alternately adapted

to a difference in brightness of the light from the star and the earth.

41. (Currently Amended) The sensor system according to claim 18, wherein said images of the stars and the earth on said common image pickup devices are produced in a common focal plane in which the images are in a pixel field, said evaluation system ~~discarding star images~~ in the common focal plane in which images of the stars are superimposed on the image of the rim of the earth by being ~~which are~~ located within a given number of pixels from the image of the rim of the earth.

42. (Currently Amended) The sensor system according to claim 41, wherein said given number of pixels of star images from the image of the rim of the ~~sun~~ earth is three.

43. (Currently Amended) The method according to claim 38, wherein the images of the stars and the rim of the earth in said common focal plane are arranged in a field defined by pixels and those images where the star images identified by the star catalog which are located within a given number of pixels from the image of the rim of the earth are ~~discarded~~ disregarded so that an accurate image of the rim of the earth is obtained without interference by those star images.

44. (Currently Amended) The method according to claim 43,

wherein the star images which are ~~discarded~~ disregarded are located within three pixels of the image of the rim of the earth.

45. (Currently Amended) The method according to claim 43, wherein the image of the rim of the earth ~~and the star images are~~ is first evaluated on a coarse basis above sub-pixel accuracy and those images in which the star images ~~which~~ are within the given number of pixels from the image of the rim of the earth are ~~discarded~~ disregarded whereafter the image of the rim of the earth is accurately obtained to sub-pixel accuracy.